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(58) Field of search

H5H

Selected US specifications from IPC sub-class H05B

(54) Electric hobs

(57) A heating unit for a glass ceramic hob has a plurality of heating element and switch means 9 for energizing the elements 3, 4 in parallel to provide a heat output capable of heating the hob rapidly to a high temperature and a temperature responsive switch 8 arranged to de-energize part of the heating means before damage to the hob can occur, whilst leaving the remainder of the heating means operative, the latter being capable by itself of maintaining the hob at a temperature above the cooking temperature but not of heating it to the damage temperature; this arrangement avoids the use of conventional thermal limiters.

Fig.2.

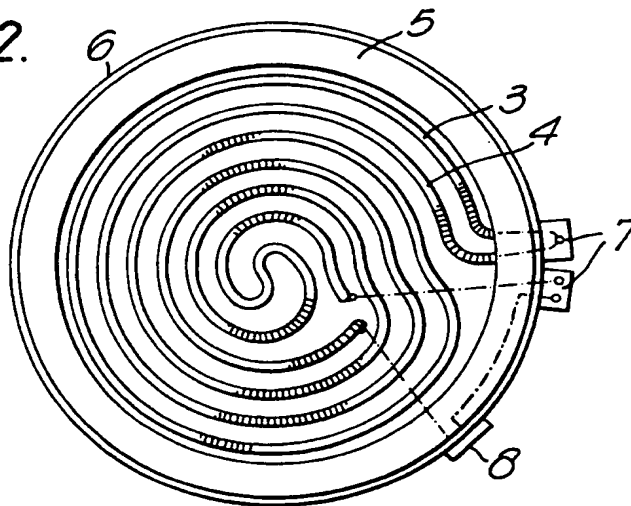
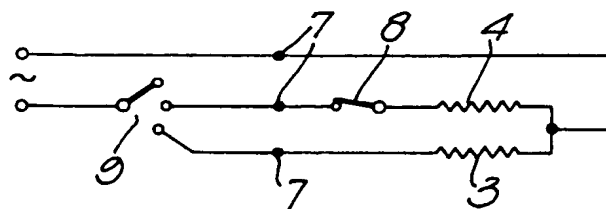


Fig.3.



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Fig.1.

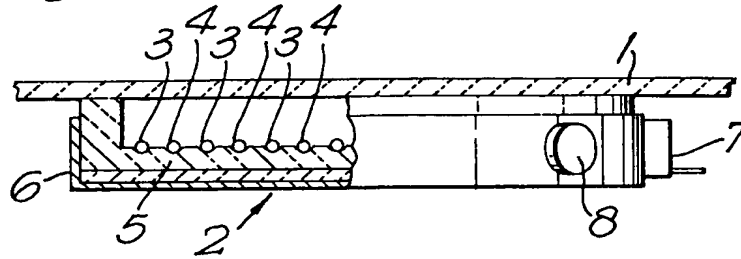


Fig.2.

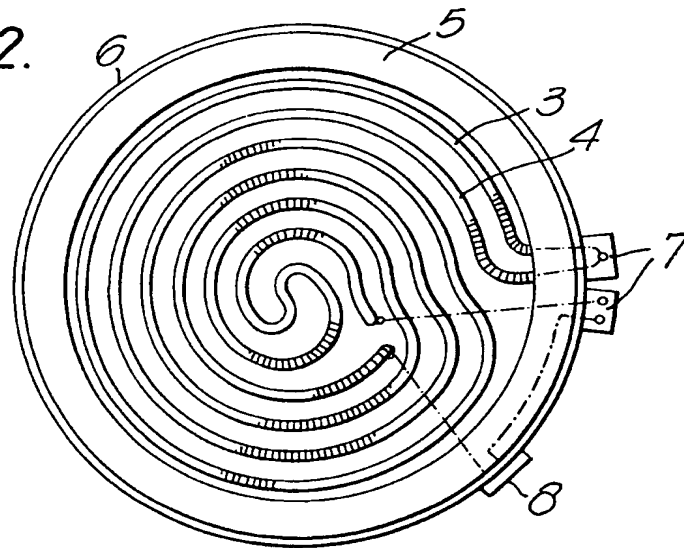
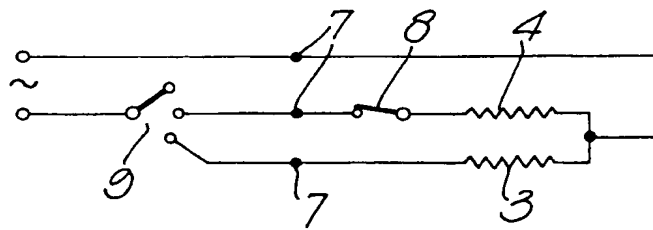


Fig.3.



## SPECIFICATION

## Electric hobs and heating units therefor

- 5 This invention relates to electric hobs of the kind in which at least one heating unit is disposed beneath a glass ceramic plate. In such a hob the or each said heating unit has usually incorporated a thermally and electrically insulating support carrying one or more electric heating elements, generally of coiled wire form, and designed to be mounted beneath the glass ceramic plate with the heating element or elements spaced from the lower surface of the plate.

- 10 In order to prevent the glass ceramic plate from being damaged due to overheating, the heating unit has commonly been provided with a thermal limiter incorporating a heat sensitive rod which extends across the unit close to the plate, and associated with switching means at the side of the unit, the limiter being arranged to allow the plate to be heated to a cooking temperature, that is to say a temperature, generally of the order of 500°C to 600°C, which is sufficient to boil cooking liquids in containers placed on the plate over the respective energised heating unit, but to cut-off the supply of heating current at a predetermined higher temperature which is, however, below that at which the plate is likely to suffer damage (i.e. the damage temperature) usually around 800°C, the thermal limiter being arranged to switch-on the current to the heating unit again when the temperature has fallen to a predetermined lower temperature.

- Such thermal limiters are, however expensive, and an object of the present invention is to provide an alternative, less expensive, means of preventing overheating of the glass ceramic plate in a heating unit of the above kind.

- According to the invention in its broadest aspect a heating unit for a hob of the kind referred to incorporates heating means comprising a plurality of heating elements, and is associated with switch means for energising the elements in parallel to provide a first heat output which is capable of heating the glass ceramic plate rapidly to a temperature which could cause damage thereto, and a temperature responsive switch arranged to de-energise part of the heating means before the damage temperature is attained, but leave the remainder of the heating means operative, the latter being capable by itself of maintaining the glass ceramic plate at a temperature above the cooking temperature but not of heating it to the damage temperature.

- Preferably the heating unit comprises first and second heating elements of coiled wire form, and is designed to be mounted beneath the glass ceramic plate with the heating elements spaced from the lower surface of the

- plate, the heating elements being associated with switch means which enables both heating elements to be energised in parallel or only the first element to be energised, the elements being such that energisation of both elements in parallel causes the plate to be heated relatively rapidly to a temperature above cooking temperature, the temperature responsive switch being connected in series with the second heating element and operable to cut out the second element only when the temperature reaches a predetermined value above the cooking temperature, but below the damage temperature, the first element remaining energised, and being such that by itself it is capable of maintaining the plate above the cooking temperature but not of heating it to the damage temperature.

- Conveniently the temperature responsive switch is in the form of a bimetallic disc switch attached to the side of a metal casing accommodating the heating element support.

- The temperature responsive switch may be fitted in an insulated tube within the heated area so as to sense the temperature of the glass, either directly or indirectly.

- By eliminating the need for a rod type thermal limiter between the heating elements and the glass ceramic plate, the invention enables the depth of the heating unit to be reduced thereby leading to a more compact structure.

- A heating unit in accordance with the invention conveniently incorporates a first heating element having a power rating of 1000W and a second element with a power rating of 500W, the elements being disposed in a spiral configuration over an approximately circular area of 200mm diameter. Alternatively the first heating element may have a power rating of 800W and the second element a power rating of 400W, the elements again being disposed in a spiral configuration over an approximately circular area, in this case of 180mm diameter.

- The hob may be a continuous glass ceramic plate having a plurality of heating units disposed beneath it, or alternatively it may consist of a sheet metal hob plate, for example of steel having a plurality of openings each having a ceramic glass plate extending across it, with a respective heating unit disposed beneath each of the glass ceramic plates.

- One glass ceramic hob and a heating unit therefore in accordance with the invention will now be described by way of example with reference to Figs. 1 to 3 of the accompanying drawings, in which

- Figure 1 illustrates a cross-section of part of the hob including the heating unit,

- Figure 2 represents a plan view of the unit itself, and

- Figure 3 represents the control circuit for the unit.

- Referring first to Fig. 1, this shows a glass ceramic plate 1 having mounted beneath it in

any convenient manner a heating unit 2 comprising two coiled wire electric heating elements 3, 4 supported within spiral grooves in the upper surface of a ceramic support 5 contained within a sheet metal casing 6. One heating element, for example the element 3, has a power output, when connected to a normal alternating current mains supply, of 1000W, and the other element 4 a power output of 500W.

The heating elements 3, 4 are connected to respective terminals 7 at the side of the casing 6, the element 4 being connected to one of its associated terminals through a temperature responsive device in the form of a bimetallic disc switch 8 attached to the side of the casing 6. The disposition of the heating elements 3, 4 is shown more clearly in Fig. 2.

The terminals 7 are connected to a manually operable rotary control switch 9 (Fig. 3) which can be rotated from an "OFF" position to a "maximum heat" position in which both heating elements 3, 4 are energised in parallel. This raises the temperature of the upper surface of the glass ceramic plate 1 relatively rapidly to a temperature sufficient to effect the boiling of liquid in a cooking vessel on the hob and at some higher temperature, below that at which damage to the glass ceramic plate is likely to occur. The thermally responsive switch 8 is arranged to operate to cut out the second heating element 4.

The operation of the first heating element 3, by itself, is insufficient to heat the glass ceramic plate to the "damage" temperature (of the order of 800°C) but is capable of maintaining the temperature of the upper surface of the plate at between 500°C and 600°C which is adequate for normal cooking.

When the switch 9 is set to a "simmering" position, only the element 3 will remain energised, even though the switch 8 has reset, so that there is no risk of the ceramic plate being damaged due to overheating in the "simmering" condition. Only when the switch 9 is reset to the "maximum heat" position, will the element again be energised provided the switch 8 has reset.

The power outputs of the heating elements need not be as above described and in a modification the main heating element 2 has a rated power output of 1200W and the "booster" heating element 3 a rated power output of 400W. Other values of heating elements may alternatively be employed.

In a hob in accordance with the invention a glass ceramic plate may be common to a plurality of heating units, each mounted in a different position beneath the plate. Alternatively the hob may be in the form of a metal supporting surface with a plurality of openings formed in it, each of which has a respective glass ceramic plate extending across it, and an associated heating unit being disposed beneath each of the plates.

It will be understood that the invention includes within its scope heating units as above described for use in either of such hobs.

## 70 CLAIMS

1. An electric hob in which at least one heating unit is disposed beneath a glass ceramic plate, said heating unit incorporating heating means comprising a plurality of heating elements, associated with switch means for energising the elements in parallel to provide a first heat output which is capable of heating the glass ceramic plate rapidly to a temperature which could cause damage thereto, and a temperature-responsive switch arranged to de-energise part of the heating means before the damage temperature is attained, but leave the remainder of the heating means operative, the latter being capable by itself of maintaining the glass ceramic plate at a temperature suitable for cooking, but not of heating it to the damage temperature.

2. A hob as claimed in Claim 1 in which said heating unit comprises first and second elements of coiled wire form spaced from the lower surface of the plate, the heating elements being associated with switch means which enables both heating elements to be energised in parallel or only the first element to be energised, the elements being such that energisation of both elements in parallel causes the plate to be heated relatively rapidly to a temperature above that suitable for cooking, the temperature responsive switch being connected in series with the second heating element and operable to cut out the second element only when the temperature reaches a predetermined value above that suitable for cooking, but below the damage temperature, the first element remaining energised, and being such that by itself it is capable of maintaining the plate at a temperature suitable for cooking, but not of heating it to the damage temperature.

3. A hob as claimed in any preceding Claim, wherein the temperature responsive switch is in the form of a bimetallic disc switch attached to the side of a metal casing, accommodating the heating element support.

4. A hob as claimed in Claim 1, 2 or 3, wherein the heating unit incorporates a first heating element having a power rating of 1000 W and a second element with a power rating of 500 W, the elements being disposed in a spiral configuration over an approximately circular area of 200mm diameter.

5. A hob as claimed in Claim 1, 2 or 3, wherein the heating element incorporates a first heating element having a power rating of 800 W and a second element with a power rating of 400 W, the elements being disposed in a spiral configuration over an approximately circular area of 180mm diameter.

6. A hob as claimed in any preceding Claim wherein the hob is a continuous glass

ceramic plate, having a plurality of heating units disposed beneath it.

7. A hob as claimed in any preceding Claim wherein the hob is formed of a sheet  
5 metal plate having a plurality of openings each having a ceramic glass plate extending across it, with a respective heating unit disposed beneath each of the glass ceramic plates.

8. A hob as described herein with reference to the accompanying drawing.  
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